

Magnetic stripe phase at the spin reorientation transition of a magnetic thin film

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One fundamental issue in magnetic nanostructure research has concerned the presence of magnetic long-range order in a two-dimensional magnetic system. It has long been established that an isotropic two-dimensional Heisenberg system does not carry long-range order at nonzero temperature. The magnetic order observed in today's ultrathin films is usually attributed to the existence of magnetic anisotropy. In an ultrathin film with perpendicular magnetocrystalline anisotropy, the spin direction could exhibit the so-called spin reorientation transition (SRT) from perpendicular to the in-plane direction of the film. At the SRT point, the perpendicular magnetocrystalline anisotropy is balanced out by the dipolar shape anisotropy and the system approaches to isotropic Heisenberg system. Thus an investigation of the magnetic phase near the SRT point is expected to reveal the magnetic origin of 2D magnetic systems. In this talk, I will present an overview and our most recent experimental result on this subject. Using photoemission electron microscopy (PEEM) to do element-specific measurement, we studied the SRT in magnetically coupled sandwiches. We show that a crossover from the anisotropy length to the dipolar length governs the formation of the magnetic stripe phase.